PCIe/104 or PCI/104-Express 4-Channel Frame Grabber User's Manual

Model 911 | Rev.B | February 2010

SENSORAY | embedded electronics

Designed and manufactured in the U.S.A

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The warranty provided herein does not cover equipment subjected to abuse, misuse, accident, alteration, neglect, or unauthorized repair or installation. Sensoray shall have the right of final determination as to the existence and cause of defect.

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A Return Material Authorization (RMA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. Sensoray will pay the shipping costs of returning to the owner parts that are covered by warranty. A restocking charge of 25% of the product purchase price will be charged for returning a product to stock.

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Special handling instructions

The circuit board contains CMOS circuitry that is sensitive to Electrostatic Discharge (ESD).

Special care should be taken in handling, transporting, and installing circuit board to prevent ESD damage to the board. In particular:

- Do not remove the circuit board from its protective anti-static bag until you are ready to install the board into the enclosure.
- Handle the circuit board only at grounded, ESD protected stations.
- Remove power from the equipment before installing or removing the circuit board.

Introduction

Model 911 is a 4-channel frame/video capture device designed for 104™, EPIC™, and EBX™ Form Factors, complying with "PCI/104-Express™ & PCIe/104™ Specification (Version 1.1)". It can be used for the applications requiring high capture rate and capturing from multiple input video channels simultaneously. It supports capturing from up-to 4 channels of NTSC/PAL/SECAM video sources.

For the need of audio capturing, Model 911 provides four channels of stereo or monochrome audio capturing associated with each of the four channels of video respectively.

For each video channel, the capturing frame rate is up to 30 fps for NTSC and 25 fps for PAL/SECAM. It makes total frame/video capturing rate up to 120 fps for NTSC and 100 fps for PAL/SECAM. The capturing resolution can be one of the followings: D1.N (NTSC), D1.P (PAL), VGA, QVGA, QQVGA, SIF, 2SIF, 4SIF, CIF, QCIF, SQCIF, 4CIF.

Associated with each channel, a general digital I/O signal is provided, for the control and/or alarming purpose. Total 4 digital I/O signals are configurable as either inputs or outputs.

A single +5V power supply through PCIe/104 bus is required to power the board.

Model 911 is implemented facing a single-lane (x1) PCI-Express interface. It is stackable for PC/104 form factor in both ways of the Stack-Up and/or Stack-Down. Also, since it supports Link Shifting logic, in one stack, up to two Model 911 boards can be used (stacked in).

Feature Summary

- Form Factor: PCIe/104 or PCI/104-Express
  Stack-Up and/or Stack-Down
- Video input: 4 individual input video channels (Composite or S-Video per channel)
- Audio input: 4 pair of stereo or 4 mono
- Resolution (Max): Full-D1:

  NTSC: 720 x 480 @ 30 fps per Channel. Total: 120 fps
  PAL: 720 x 576 @ 25 fps per Channel. Total: 100 fps

- Other supported video Resolution:

D1.N:	720 x 480	D1.P:	720 x 576	D.5:	480 x 352
SIF:	352 x 240	2SIF:	704 x 240	4SIF:	704 x 480
VGA:	640 x 480	QVGA:	320 x 240	QQVGA:	160 x 112
CIF:	352 x 288	QCIF:	176 x 144	SQCIF:	128 x 96
4CIF:	704 x 576				

- Frame/Video capturing and encoding:

  Raw frame capturing: YCrCb / RGB

  up to 30 fps x 4, for NTSC (Total: 120 fps)
  up to 25 fps x 4, for PAL (Total: 100 fps)

  Raw video capturing: YCrCb / RGB

  video up to 30 fps x 4, for NTSC (Total: 120 fps)
  video up to 25 fps x 4, for PAL (Total: 100 fps)

  Raw audio capturing:

  audio sampling rate @ 32KHz / 44.1KHz / 48KHz

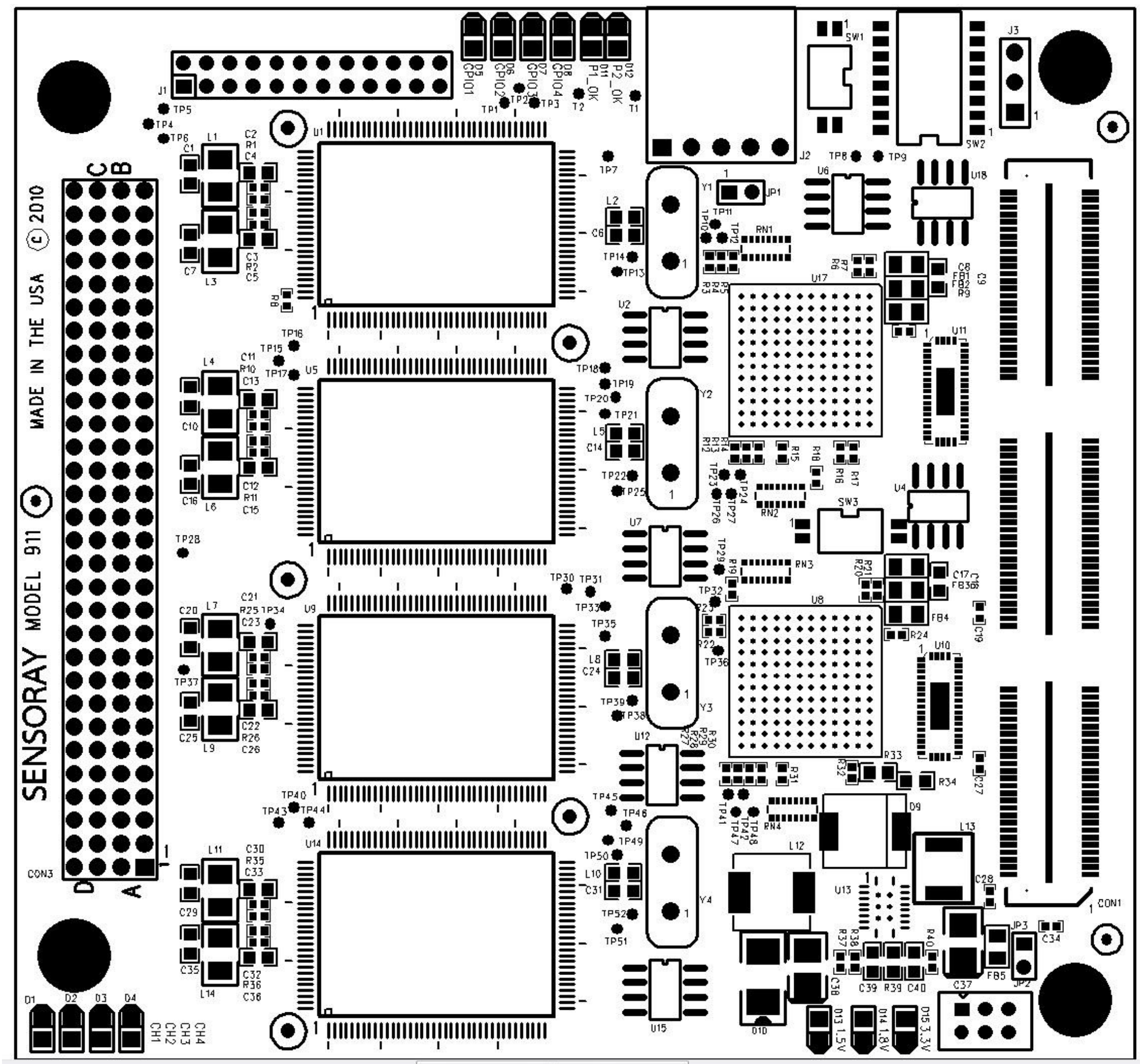
  JPEG frame, MPEG-1/2/4, H.264, or MJPEG A/V capturing:

  Can be done with 3rd party software or CODEC,
  or OSS software like FFMPEG, MEncoder, and etc.

- 4 digital inputs or 4 digital outputs: TTL level signals
- Driver and SDK for Windows available
- Linux drive natively supported by kernel.org, complying with V4L and/or V4l2

Reference

Board Picture and Connector Layout



Connector List

CON1	PCIe/104 Bus Connector — Top
CON2	PCIe/104 Bus Connector — Bottom
CON3	PC/104-Plus PCI Bus Connector
J1	24-pin Connector: break-in/out for Composite Video Input for Channel-1, 2, 3, and 4 S-Video Input for Channel-1, 2, 3, and 4 Stereo/mono Audio Input for Channel-1, 2, 3, and 4 Digital Inputs/Output for Channel-1, 2, 3, and 4
J2	General Purpose Digital I/O: configurable Digital Inputs for Channel-1, 2, 3, and 4 or Digital Output for Channel-1, 2, 3, and 4

Connector Pin/Signal Definitions

PCIe/104 Bus Connectors: CON1 (Top) and CON2 (Bottom)

Top Connector – CON1					Bottom Connector – CON2				
Pin	**Signal**		**Signal**	**Pin**	**Pin**	**Signal**		**Signal**	**Pin**
1	USB_OC#*		PE_RST#	2	2	PE_RST#		USB_OC#*	1
3	**+3.3V***		**+3.3V***	4	4	**+3.3V***		**+3.3V***	3
5	USB_1p*		USB_0p*	6	6	USB_0p*		USB_1p*	5
7	USB_1n*		USB_0n*	8	8	USB_0n*		USB_1n*	7
9	**GND**		**GND**	10	10	**GND**		**GND**	9
11	PEx1_1Tp		PEx1_0Tp	12	12	PEx1_0Tp		PEx1_1Tp	11
13	PEx1_1Tn		PEx1_0Tn	14	14	PEx1_0Tn		PEx1_1Tn	13
15	**GND**		**GND**	16	16	**GND**		**GND**	15
17	PEx1_2Tp		PEx1_3Tp	18	18	PEx1_3Tp		PEx1_2Tp	17
19	PEx1_2Tn		PEx1_3Tn	20	20	PEx1_3Tn		PEx1_2Tn	19
21	**GND**	**+**	**GND**	22	22	**GND**	**+**	**GND**	21
23	PEx1_1Rp	**5**	PEx1_0Rp	24	24	PEx1_0Rp	**5**	PEx1_1Rp	23
25	PEx1_1Rn	**V**	PEx1_0Rn	26	26	PEx1_0Rn	**V**	PEx1_1Rn	25
27	**GND**	**o**	**GND**	28	28	**GND**	**o**	**GND**	27
29	PEx1_2Rp	**l**	PEx1_3Rp	30	30	PEx1_3Rp	**l**	PEx1_2Rp	29
31	PEx1_2Rn	**t**	PEx1_3Rn	32	32	PEx1_3Rn	**t**	PEx1_2Rn	31
33	**GND**	**s**	**GND**	34	34	**GND**	**s**	**GND**	33
35	PEx1_1Clkp		PEx1_0Clkp	36	36	PEx1_0Clkp		PEx1_1Clkp	35
37	PEx1_1Clkn		PEx1_0Clkn	38	38	PEx1_0Clkn		PEx1_1Clkn	37
39	**+5V**		**+5V**	40	40	**+5V**		**+5V**	39
41	PEx1_2Clkp		PEx1_3Clkp	42	42	PEx1_3Clkp		PEx1_2Clkp	41
43	PEx1_2Clkn		PEx1_3Clkn	44	44	PEx1_3Clkn		PEx1_2Clkn	43
45	**CPU_DIR**		**PWRGOOD**	46	46	**PWRGOOD**		**CPU_DIR**	45
47	SMB_DAT*		PEx16_x8_x4_Clkp*	48	48	PEx16_x8_x4_Clkp*		SMB_DAT*	47
49	SMB_CLK*		PEx16_x8_x4_Clkn*	50	50	PEx16_x8_x4_Clkn*		SMB_CLK*	49
51	SMB_ALERT*		PSON#*	52	52	PSON#*		SMB_ALERT*	51
53	RSVD/WAKE#*		PEG_ENA#*	54	54	PEG_ENA#*		RSVD/WAKE#*	53
55	**GND**		**GND**	56	56	**GND**		**GND**	55
57	PEx16_0T(8)p*		PEx16_0T(0)p*	58	58	PEx16_0T(0)p*		PEx16_0T(8)p*	57
59	PEx16_0T(8)n*		PEx16_0T(0)n*	50	50	PEx16_0T(0)n*		PEx16_0T(8)n*	59
61	**GND**		**GND**	62	62	**GND**		**GND**	61
63	PEx16_0T(9)p*		PEx16_0T(1)p*	64	64	PEx16_0T(1)p*		PEx16_0T(9)p*	63
65	PEx16_0T(9)n*		PEx16_0T(1)n*	66	66	PEx16_0T(1)n*		PEx16_0T(9)n*	65
67	**GND**		**GND**	68	68	**GND**		**GND**	67
69	PEx16_0T(10)p*		PEx16_0T(2)p*	60	70	PEx16_0T(2)p*		PEx16_0T(10)p*	69
71	PEx16_0T(10)n*	**+**	PEx16_0T(2)n*	72	72	PEx16_0T(2)n*	**+**	PEx16_0T(10)n*	71
73	**GND**	**5**	**GND**	74	74	**GND**	**5**	**GND**	73
75	PEx16_0T(11)p*	**V**	PEx16_0T(3)p*	76	76	PEx16_0T(3)p*	**V**	PEx16_0T(11)p*	75
77	PEx16_0T(11)n*	**o**	PEx16_0T(3)n*	78	78	PEx16_0T(3)n*	**o**	PEx16_0T(11)n*	77
79	**GND**	**l**	**GND**	70	80	**GND**	**l**	**GND**	79
81	PEx16_0T(12)p*	**t**	PEx16_0T(4)p*	82	82	PEx16_0T(4)p*	**t**	PEx16_0T(12)p*	81
83	PEx16_0T(12)n*	**s**	PEx16_0T(4)n*	84	84	PEx16_0T(4)n*	**s**	PEx16_0T(12)n*	83
85	**GND**	*	**GND**	86	86	**GND**	*	**GND**	85
87	PEx16_0T(13)p*		PEx16_0T(5)p*	88	88	PEx16_0T(5)p*		PEx16_0T(13)p*	87
89	PEx16_0T(13)n*		PEx16_0T(5)n*	90	90	PEx16_0T(5)n*		PEx16_0T(13)n*	89
91	**GND**		**GND**	92	92	**GND**		**GND**	91

93	PEx16_0T(14)p*		PEx16_0T(6)p*	94	94	PEx16_0T(6)p*		PEx16_0T(14)p*	93
95	PEx16_0T(14)n*		PEx16_0T(6)n*	96	96	PEx16_0T(6)n*		PEx16_0T(14)n*	95
97	**GND**		**GND**	98	98	**GND**		**GND**	97
99	PEx16_0T(15)p*		PEx16_0T(7)p*	100	100	PEx16_0T(7)p*		PEx16_0T(15)p*	99
101	PEx16_0T(15)n*		PEx16_0T(7)n*	102	102	PEx16_0T(7)n*		PEx16_0T(15)n*	101
103	**GND**		**GND**	104	104	**GND**		**GND**	103
105	SDVO_DAT(PENA#)*		SDVO_CLK*	106	106	SDVO_CLK*		SDVO_DAT(PENA#)*	105
107	**GND**		**GND**	108	108	**GND**		**GND**	107
109	PEx16_0R(8)p*		PEx16_0R(0)p*	110	110	PEx16_0R(0)p*		PEx16_0R(8)p*	109
111	PEx16_0R(8)n*		PEx16_0R(0)n*	112	112	PEx16_0R(0)n*		PEx16_0R(8)n*	111
113	**GND**		**GND**	114	114	**GND**		**GND**	113
115	PEx16_0R(9)p*		PEx16_0R(1)p*	116	116	PEx16_0R(1)p*		PEx16_0R(9)p*	115
117	PEx16_0R(9)n*		PEx16_0R(1)n*	118	118	PEx16_0R(1)n*		PEx16_0R(9)n*	117
119	**GND**		**GND**	120	120	**GND**		**GND**	119
121	PEx16_0R(10)p*		PEx16_0R(2)p*	122	122	PEx16_0R(2)p*		PEx16_0R(10)p*	121
123	PEx16_0R(10)n*	**+**	PEx16_0R(2)n*	124	124	PEx16_0R(2)n*	**+**	PEx16_0R(10)n*	123
125	**GND**	**1**	**GND**	126	126	**GND**	**1**	**GND**	125
127	PEx16_0R(11)p*	**2**	PEx16_0R(3)p*	128	128	PEx16_0R(3)p*	**2**	PEx16_0R(11)p*	127
129	PEx16_0R(11)n*	**V**	PEx16_0R(3)n*	130	130	PEx16_0R(3)n*	**V**	PEx16_0R(11)n*	129
131	**GND**	**o**	**GND**	132	132	**GND**	**o**	**GND**	131
133	PEx16_0R(12)p*	**l**	PEx16_0R(4)p*	134	134	PEx16_0R(4)p*	**l**	PEx16_0R(12)p*	133
135	PEx16_0R(12)n*	**t**	PEx16_0R(4)n*	136	136	PEx16_0R(4)n*	**t**	PEx16_0R(12)n*	135
137	**GND**	**s**	**GND**	138	138	**GND**	**s**	**GND**	137
139	PEx16_0R(13)p*	*	PEx16_0R(5)p*	140	140	PEx16_0R(5)p*	*	PEx16_0R(13)p*	139
141	PEx16_0R(13)n*		PEx16_0R(5)n*	142	142	PEx16_0R(5)n*		PEx16_0R(13)n*	141
143	**GND**		**GND**	144	144	**GND**		**GND**	135
145	PEx16_0R(14)p*		PEx16_0R(6)p*	146	146	PEx16_0R(6)p*		PEx16_0R(14)p*	145
147	PEx16_0R(14)n*		PEx16_0R(6)n*	148	148	PEx16_0R(6)n*		PEx16_0R(14)n*	147
149	**GND**		**GND**	150	150	**GND**		**GND**	149
151	PEx16_0R(15)p*		PEx16_0R(7)p*	152	152	PEx16_0R(7)p*		PEx16_0R(15)p*	151
153	PEx16_0R(15)n*		PEx16_0R(7)n*	154	154	PEx16_0R(7)n*		PEx16_0R(15)n*	153
155	**GND**		**GND**	156	156	**GND**		**GND**	155

Note:
* Pass-through only for PCIe/104 Stacking

PC/104-Plus PCI Bus Connector: CON3

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND/Key*	B1	RSVD*	C1	+5 V*	D1	AD0*
A2	VIO*	B2	AD2*	C2	AD1*	D2	+5 V*
A3	AD5*	B3	Ground	C3	AD4*	D3	AD3*
A4	C/BE0#*	B4	AD7*	C4	Ground	D4	AD6*
A5	Ground	B5	AD9*	C5	AD8*	D5	Ground
A6	AD11*	B6	VIO*	C6	AD10*	D6	M66EN*
A7	AD14*	B7	AD13*	C7	Ground	D7	AD12*
A8	+3.3V*	B8	C/BE1#*	C8	AD15*	D8	+3.3V*
A9	SERR#*	B9	Ground	C9	SB0*	D9	PAR*
A10	Ground	B10	PERR#*	C10	+3.3V*	D10	SDONE*
A11	STOP#*	B11	+3.3V*	C11	LOCK*	D11	Ground
A12	+3.3V*	B12	TRDY#*	C12	Ground	D12	DEVSEL#*
A13	FRAME#*	B13	Ground	C13	IRDY#*	D13	+3.3V*
A14	Ground	B14	AD16*	C14	+3.3V*	D14	C/BE2#*
A15	AD18*	B15	+3.3V*	C15	AD17*	D15	Ground
A16	AD21*	B16	AD20*	C16	Ground	D16	AD19*
A17	+3.3V*	B17	AD23*	C17	AD22*	D17	+3.3V*
A18	IDSEL0*	B18	Ground	C18	IDSEL1*	D18	IDSEL2*
A19	AD24*	B19	C/BE3#*	C19	VIO*	D19	IDSEL3*
A20	Ground	B20	AD26*	C20	AD25*	D20	Ground
A21	AD29*	B21	+5 V*	C21	AD28*	D21	AD27*
A22	+5 V*	B22	AD30*	C22	Ground	D22	AD31*
A23	REQ0#*	B23	Ground	C23	REQ1#*	D23	VIO*
A24	Ground	B24	REQ2#*	C24	+5 V*	D24	GNT0#*
A25	GNT1#*	B25	VIO*	C25	GNT2#*	D25	Ground
A26	+5 V*	B26	CLK0*	C26	Ground	D26	CLK1*
A27	CLK2*	B27	+5 V*	C27	CLK3*	D27	Ground
A28	Ground	B28	INTD#*	C28	+5 V*	D28	RST#*
A29	+12 V*	B29	INTA#*	C29	INTB#*	D29	INTC#*
A30	-12 V*	B30	RSVD *	C30	RSVD *	D30	Ground

Note:
* not connected, only pass-through for PC/104+ Stacking

Full A/V (Video & Audio) and Digital I/O Connector: J1

Pin	Signal	Pin	Signal
1	+3.3V	2	Digital Input/Output for Channel-4
3	Digital Input/Output for Channel-3	4	Digital Input/Output for Channel-2
5	Digital Input/Output for Channel-1	6	Digital Ground
7	Audio In – L for Channel-4	8	Audio In – R for Channel-4
9	Audio In – L for Channel-3	10	Audio In – R for Channel-3
11	Audio In – L for Channel-2	12	Audio In – R for Channel-2
13	Audio In – L for Channel-1	14	Audio In – R for Channel-1
15	Analog Ground	16	Analog Ground
17	Composite Video In / S-Video In – Y for Channel-4	18	S-Video In – C for Channel-4
19	Composite Video In / S-Video In – Y for Channel-3	20	S-Video In – C for Channel-3
21	Composite Video In / S-Video In – Y for Channel-2	22	S-Video In – C for Channel-2
23	Composite Video In / S-Video In – Y for Channel-1	24	S-Video In – C for Channel-1

Digital I/O Connectors: J3

Pin	Signal
1	GPIO1 – Digital Input/Output for Channel-1
2	GPIO2 – Digital Input/Output for Channel-2
3	GPIO3 – Digital Input/Output for Channel-3
4	GPIO4 – Digital Input/Output for Channel-4
5	Digital Ground

DIP Switches

Digital I/O Configuration DIP Switch: SW1

The DIP switch, SW1, is used for configuring Digital I/O routings. Refer to the table below for the routing details:

SW1-1	SW1-2	Description
OFF	OFF	Disconnect all Digital Inputs/Outputs from/to the Connector J1 and J3
ON	ON	Connect all four GPIO[4:1] signals from the PEX8112 (PCI-Express-to-PCI Bridge) to the Connector J1 and J3; Configure the GPIO[4:1] as Digital Inputs or Outputs, using software
ON	OFF	Connect all 4-channel GPIO signals from four SAA713xHL chipset's GPIO0 to the Connector J1 and J3; Configure the four GPIO0 signals as Digital Inputs or Outputs, using software

Manufacturing DIP Switch: SW2

The DIP switch, SW2, is for Sensoray manufacturing only. Therefore, it is not described in this manual.

Stack-Up/Stack-Down Control DIP Switch: SW3

The DIP switch, SW3, is used for PCIe/104 Stack-Up/Stack-Down Control/Configuring. Refer to the table below for the configuring details:

SW3-1	SW#-2	Description
OFF	OFF	Stack-Up/Stack-Down Control by CPU board
ON	OFF	Stack-Up fixed (Just in case – CPU board has no Stack-Up/Stack-Down Control signal provided)
ON	ON	Stack-Down fixed (Just in case – CPU board has no Stack-Up/Stack-Down Control signal provided)
ON	OFF	Not Valid

LED

Channel Status Indicators: D1 ~ D4

The LED D1, D2, D3, and D4 can be used for indicating the channel status.

LED	Signal
D1	Status for Channel-1, the driving signal is connected to the Channel-1 capturing chipset SAA713xHL's GPIO15. A logic low turns the LED on, and a high turns it off
D2	Status for Channel-2, the driving signal is connected to the Channel-2 capturing chipset SAA713xHL's GPIO15. A logic low turns the LED on, and a high turns it off
D3	Status for Channel-3, the driving signal is connected to the Channel-3 capturing chipset SAA713xHL's GPIO15. A logic low turns the LED on, and a high turns it off
D4	Status for Channel-4, the driving signal is connected to the Channel-4 capturing chipset SAA713xHL's GPIO15. A logic low turns the LED on, and a high turns it off

GPIO Status Indicators: D5 ~ D8:

The LED D5, D6, D7, & D8 are used for indicating the status of the digital input/output signals (pins), labeled as GPIO1 ~ GPIO4 on the board, and directly connected to the J3. A logic 0 (low) turns the LED on and a logic 1 (high) turns it off.

LED	Signal
D5	Status of GPIO1 (associated with Channel-1)
D6	Status of GPIO2 (associated with Channel-2)
D7	Status of GPIO3 (associated with Channel-3)
D8	Status of GPIO4 (associated with Channel-4)

Power-OK indicators: D11 ~ D15

The LED D11, D12, D13, D14, and D15 are used for indicating on-board Power-OK status.

LED	Signal
D15	3.3V Power-OK Status
D14	1.8V Power-OK Status
D13	1.5V Power-OK Status
D12	Power-OK Status for 1st PLX PEX8112 (PCI-Express to PCI Bridge)
D11	Power-OK Status for 2nd PLX PEX8112 (PCI-Express to PCI Bridge)

Software

Device Driver and SDK

Device driver and SDK including driver API & demo application programs are available for both Windows and Linux.

Windows

Sensoray Co. provides 811 WDM driver and DirectX filter for Windows platform, which applies to Model 911 too. The SDK includes the Windows driver, DLL, Demo application & source code, etc. It is packaged in a "s811_v1xx.zip" file for distribution and/or for customer(s) to download from Sensoray's website.

Refer to the "Model 811 Windows SDK User's Manual" for the SDK, DLL, API, and programming details.

Since the driver is built and based on the WDM BDA and DirectShow oriented architecture, the Microsoft GraphEdit utility can be used for building live A/V preview and/or capturing application. Also, 3rd party freeware/shareware like VLC player and AMCap software can be used for still-frame / live-video capturing and preview.

Linux

The device driver for Linux is natively in the Linux kernel, provided by kernel.org and comes with most commonly used and/or popular Linux distributions. The API complies with standard V4L2 (Video for Linux Version 2), formerly known as V4L (Video for Linux). The API spec and capturing sample program can be downloaded from following websites:

http://v4l2spec.bytesex.org/
http://www.linuxtv.org/downloads/video4linux/API/V4L2_API/spec-single/v4l2.html

In addition to the application samples from V4L/V4L2, Sensoray Co. provides customized capturing sample/demo programs and HOW-TO type of app/instruction notes for the Model 811, upon customer's requests.

For live video preview or capturing, commonly used V4L application programs like XawTV can be used for capturing/previewing.

For capturing JPEG frame, MPEG-1/2/4, H.264 or MJPEG video, 3rd party's or OSS libraries and CODECs can be used and integrated in the application programs. As a good example, FFMPEG (http://en.wikipedia.org/wiki/FFmpeg) is a well-known and highly recommended OSS that can be used with 911. Sensoray Co. provides an application note on how to use command-line based FFMPEG to capture compressed A/V (video or audio).

Specifications

Form Factor	PCI/104-Express or PCIe/104: Stackable for both Stack-Up and Stack-Down
Video Formats	NTSC, PAL, SECAM
Video Inputs	4 input channels, simultaneously: 4 Composite video via a 24-pin connector, 75 Ohms; or 4 S-Video via the same 24-pin connector, 75 Ohms; or combinations up to 4 channels of video in, 75 Ohms
Audio Inputs	4 input channels: associated with 4 separated video channels Stereo or mono for each channel Break-in via the same 24-pin connector Signal level: Line-in level, +/- 1.0V
Capturing Mode	Raw: RGB and/or YUV
Video Capture Rate	Up to: 120 (30x4) frames/sec for NTSC/RS-170/CCIR 100 (25x4) frames/sec for PAL/SECAM
Audio Sampling Rate	Configurable: 32KHz, 44.1KHz, or 48KHz
Frame/Video Encoding	Could be done by software and/or 3rd party CODEC: JPEG, MPEG-1/2/4, MJPEG, and H.264
Resolution	Full-D1: (Maximum) NTSC: 720x480 PAL: 720x576 Supports: D1.N: 720x480 D1.P: 720x576 D.5: 480x352 SIF: 352x240 2SIF: 704x240 4SIF: 704x480 VGA: 640x480 QVGA: 320x240 QQVGA: 160x112 CIF: 352x288 QCIF: 176x144 SQCIF: 128x96 4CIF: 704x576
Digital I/O	4 inputs or 4 outputs: TTL signals 4 configurable inputs/outputs via a connector; all 4 inputs/outputs routed to the 24-pin connector, as well
Bus	PCI/104-Express or PCIe/104: PCI-Express x1 Compliant with: PCI/104-Express & PCIe/104 Specification (Version 1.1) PCI-Express Base Specification (Revision 1.1) PCI-to-PCI Bridge Specification (Revision1.2)
OS Platform	Windows and Linux
Power	6.5W, +5V @ 1.3A
Temperature	0 – 70 C
Board Size	3.775” x 3.55” (96mm x 90mm)